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NEW TORYMIDAE FROM TERTIARY AMBER OF THE DOMINICAN REPUBLIC AND A WORLD LIST OF FOSSIL TORYMIDS (HYMENOPTERA: CHALCIDOIDEA)

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Abstract.—Two Torymidae (Monodontomerinae) are described from Dominican Republic amber: **Zophodetus woodruffi** new genus, new species (Monodontomerini), and *Neopalachia* **bouceki**, new species (Palachiini). These are the first New World torymids found in amber. A world list of torymid fossil species is given.

Insects from the fossil amber deposits of the Dominican Republic, although extremely abundant, are just now being brought to the attention of scientists. Apparently only one species of stingless bee (Wille and Chandler, 1964) has been described from these deposits. Recently R. E. Woodruff (Florida State Collection of Arthropods, Gainesville, Florida) made available a large collection of newly acquired material to the scientific community under auspices of a grant from the National Science Foundation (#77-01569). This material was purchased from local amber mines, as well as from commercial sources such as jewelers. The present paper provides descriptions of the first known torymids from amber in the Western Hemisphere, as well as the first report upon the results of Dr. Woodruff's work. In addition, a world list of fossil torymids is presented as a guide for future work.

Sanderson and Farr (1960) traced the history of Dominican amber from its supposed original discovery by Columbus in the late 1400's to the time of their writing. Little subsequent work has been done, with the exception of the single species described by Wille and Chandler in 1964. The principal deposits lie northwest of Santiago between Altamira and Canca and are believed to be Oligocene in age (Sanderson and Farr, 1960). Other deposits are now known from the area north of Bayaguana (Woodruff, personal communication). Because amber is widely transported in its use for jewelry, the exact locality of collection is seldom known for purchased material.

Zophodetus Grissell, New Genus

Type-species: *Zophodetus woodruffi*, new species.

Head equal in width to pronotum, with well-developed occipital carina; antennal scrobe not reaching midocellus, toruli (Fig. 4) slightly closer to dorsum of head than venter (17:19), antennal formula 11173 (Fig. 6). Pronotum sharply margined dorsolaterally, with sides sloping distinctly inward but without distinct lateral depression, anteriorly steplike in profile (Fig. 1); notauli complete; scutellum without frenum; posterior edge of mesepimeron straight; propodeum 1.3× length of large metanotum (lateral view), dorsoventrally compressed and projecting laterally nearly 0.66× width of scutellum, without median carina but with prominent lateral carinae (Fig. 2); fore, mid, and hindcoxae in ratio of 21:19:30 (Fig. 1), fore and midtibiae with single apical spur, hindtibia with 2 spurs, ratio of longer spur to hindbasitarsus (longest view) 8:15, hindfemur with ventral edge bulged but without teeth or serrations (Fig. 5); wings with setation well developed, ratio of submarginal:marginal:postmarginal:stigmal veins as 60:23:15:6 (Fig. 7).

Presently subfamily and generic concepts for Torymidae are far from adequate. Within current subfamily limits (as defined by Crawford, 1914; Milliron, 1949—corrected by Grissell, 1976: 9; Bouček, 1978), *Zophodetus* would fall among the heterogenous Monodontomerinae. Szelenyi (1957) provided the most recent world key to genera, but it is artificial and largely obsolete. Currently my own work suggests a number of recognized Nearctic genera are probably unnecessary, and changes are likely to be made. The use of hindfemora and the various interpretations of large and small denticles, serrations, or angles, as well as propodeal carinae, are too subjective, in my opinion, for generic characterization.

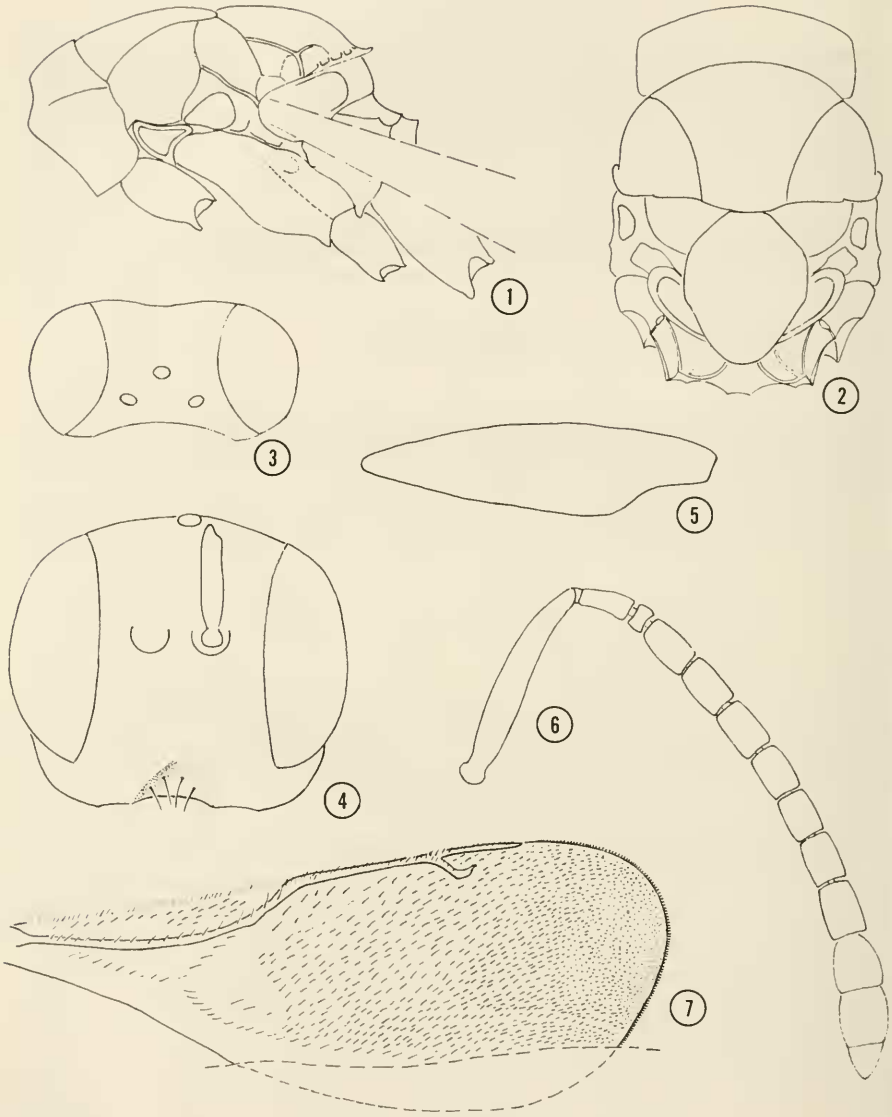
Among the monodontomerines in Szelenyi's key (1957), *Zophodetus* comes close to genera such as *Microdontomerus* or *Antistrophoplex*, but does not fit well among them. The placement of the toruli near the midpoint of the head (i.e., *Podagrion*-like, as opposed to nearer the clypeus), the metanotum almost 0.7× the length of the propodeum (generally much less than 0.5× in most genera), and the wide and carinate propodeum (generally without carinae or with simple median and/or submedian carinae in a few genera) are characters unique to *Zophodetus*. Exact placement of this genus will have to await reassessment of generic concepts in the Monodontomerinae.

The generic name is derived from the greek "zophos" (darkness) and "detos" (bound) in reference to the long period of underground interment.

Zophodetus woodruffi Grissell, New Species

Figs. 1–7

Holotype female.—Body length 2.8 mm plus ovipositor *ca* 1.1 mm. Head, thorax, fore and midcoxae (laterally) and hindcoxa, metallic green; abdomen



Figs. 1–7. *Zophodetus woodruffi*. 1–2, Thorax: 1, Lateral view; 2, Dorsal view. 3–4, Head: 3, Dorsal view; 4, Frontal view. Fig. 5, Hindfemur, lateral view. Fig. 6, Antenna, lateral view. Fig. 7, Wing, dorsal view. (Dashed lines indicate areas where view obstructed by imperfections in amber.)

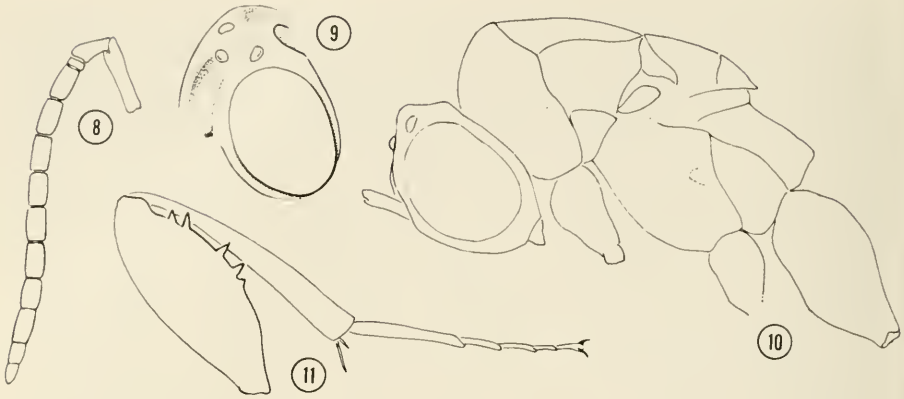
with terga partially green but some areas translucent white (or possibly surrounded by air layer); scape and legs yellow including ventral aspects of fore and midcoxae; pedicel and flagellum black; wing veins brown. Head, thorax (except mesepimeron and propodeum), and coxae evenly reticulate to reticulate rugose; propodeum rugulose between major carinae; abdomen alutaceous. Face (Fig. 4) wider than long (4:3), eyes asetose, clypeus concave along anterior margin, devoid of setae except 4 which project downwardly, intermalar distance *ca* 3× length of malar distance; OOL 1.3× and POL 3× lateral ocellus diameter (Fig. 3); antenna (Fig. 6) slightly clavate with ratio 26:6:2:6:7:6:6:6:6:6:19 (club). Thorax as shown in Figs. 1, 2; scutellum with posterior edge lamelliform and upturned; posterior edge of metapleuron broadly lamelliform; propodeum with prominent submedian and prespiracular carinae as well as lesser developed carina between these 2, median area between submedian carinae depressed, spiracle touching metanotum and about its own diameter from nearest posterior margin, propodeum posteriorly with vertical face on either side of petiole insertion. Wing (Fig. 7) with distinct cubital, basal, and median veins indicated by setal tracts, basal cell asetose, costal cell with complete row of setae and several dozen setae in broken rows along anterior border. Abdomen equal in length to thorax, terga 1–4 with definite median incisions. Ovipositor equal to length of abdomen.

Holotype.—Dominican Republic amber (probably from the general amber deposit north and west of Santiago), purchased by R. E. Woodruff, 1977; deposited in the Florida State Collection of Arthropods, Gainesville, Florida.

Discussion.—This species is named for Dr. Robert E. Woodruff who has saved a biological treasure from the clutches of commerce.

Neopalachia bouceki Grissell, New Species
Figs. 8–11

Holotype female.—(Specimen imbedded so that perfect lateral view is given but other aspects cannot be seen without considerable distortion; for this reason it is not possible to measure ratios of structures requiring dorsal or ventral view.) Body length 3.4 mm plus ovipositor 5.8 mm. Head:thorax:abdomen:ovipositor in ratio of 4:15:20:70. Head, thorax, bases of coxae, base of hindfemur, and dorsum of abdomen metallic green; scape, apices of coxae, apex and venter of hindfemur, and sides of abdomen yellowish. Head (except scrobes), dorsum of thorax (except frenum), propodeum, and coxae evenly, densely reticulate (appearing shagreened); thorax laterally (except mesepimeron) and femora coriaceous; scrobes, frenum, mesepimeron, and abdomen polished. Head with occipital carina; eye in lateral view 0.7× height of head (Fig. 10), median ocellus at dorsal apex of



Figs. 8–11. *Neopalachia bouceki*. 8, Antenna, lateral view. 9, Head, three-fourths, dorsal view. 10, Head and thorax, lateral view. 11, Hindfemur, lateral view.

scrobe, ocelli placed on flattened frontovertex (Fig. 9); antenna filiform with ratio of 12:6:2:6:6:6:6:6:6:5:12 (club) (Fig. 8). Thorax (Fig. 10) with pronotum almost vertical (this does not appear to be an artifact of preservation); frenum distinct, 0.33× length of scutellum; propodeum without carinae; ratio of fore:mid:hindcoxae as 22:15:35; hindcoxae with setae only on distal ½ of dorsal surface. Wing with basal vein and cubital vein setose, basal cell asetose, costal cell difficult to see but at least with distal row of setae along anterior ventral margin of cell, speculum mostly bare, ratio of submarginal:marginal:postmarginal:stigmal veins as 62:33:10:6. Hindfemur shown in Fig. 11. Abdomen 1.3× length of thorax, without petiole, terga appearing entire (without median incisions, though this character cannot be seen clearly through the amber), subequal in length. Ovipositor 3.5× length of abdomen.

Holotype.—Dominican Republic amber (probably from the general amber deposit north and west of Santiago), purchased by R. E. Woodruff, 1977; deposited in the Florida State Collection of Arthropods, Gainesville, Florida.

Discussion.—The placement of this species in the Palachiini (as defined by Bouček, 1976, 1978) of the Monodontomerinae is based upon the denticulate hindfemora and the almost straight hindtibia which is truncate and has two apical spurs. Currently three genera are recognized in this tribe, namely *Palachia* Bouček and *Propalachia* Bouček from Africa, Asia and Europe, and *Neopalachia* Bouček from Trinidad. The new species *bouceki* seems somewhat intermediate to all three genera as follows: Approaching *Palachia* and *Neopalachia* in the presence of a frenum (absent in *Propalachia*) and relatively short propodeum (not having an elongate neck which

protrudes beyond base of hindcoxae as in *Propalachia*); approaching *Neopalachia* and *Propalachia* in the elongate stigmal vein (rudimentary in *Palachia*) and the rounded pronotum (angulate and steplike in *Palachia*); possibly approaching *Propalachia* in first tergum not incised medially, though this character cannot be seen distinctly (incised in *Palachia* and *Neopalachia*), and approaching *Neopalachia* in female with filiform antenna without micropilosity on club (clavate and with micropilosity in *Palachia* and *Propalachia*). It is distinct from all three of these genera, particularly in the shape of the head, with the median ocellus at the apex of the scrobes and the ocelli on the flattened frontovertex (in other Palachiini the median ocellus is above the scrobes and the frontovertex is curved). After seeing the specimen, Z. Bouček (*in litt.*) suggested that *bouceki* would be suitably placed as a new genus or with *Neopalachia*. Considering our limited knowledge of the Palachiini, the number of characters *bouceki* shares with *Neopalachia*, and the West Indies distribution of this genus, I believe *bouceki* may acceptably be placed in *Neopalachia* at this time.

The only other described species of *Neopalachia* is *noyesi* Bouček (1978) from Trinidad. In addition to the peculiarities of the head just mentioned, *N. bouceki* differs from *noyesi* by the following characters: *bouceki* without interantennal lamella (present in *noyesi*), postmarginal vein 1.7× stigmal vein (*noyesi* 4.0×), hindfemora with uneven denticles, some spaced much farther apart than their own lengths (*noyesi* with about ten teeth arranged regularly as on a comb). These characters are compared in Figs. 8–11 of this paper and Figs. 20–23 of Bouček, 1978. Thus far *N. noyesi* and *bouceki* are the only Palachiini from the New World.

I take pleasure in naming this species for Dr. Z.Bouček in recognition of his exemplary devotion and standards in working with Chalcidoidea.

Fossil Torymidae

In 1975 Yoshimoto presented a list of known chalcidoid fossils. Because his list omitted several species, I present a list below which includes the known world torymid fossils. In some cases it may not be possible to ascertain even the correct subfamily placement for these specimens (see Brues, 1923: 346; Grissell, 1976: 89–90).

Monodontomerus primaevus Brues, 1923: 345–346. Lower Oligocene; Baltic amber; no locality.

Neopalachia bouceki Grissell, new species. Oligocene; Dominican amber; Dominican Republic.

Palaeotorymus aciculatus Brues, 1910: 21. Miocene; shale; Florissant, Colorado.

Palaeotorymus laevis Brues, 1910: 20. Miocene; shale; Florissant, Colorado.

Palaeotorymus striatus Brues, 1910: 20. Miocene; shale; Florissant, Colorado.

Palaeotorymus typicus Brues, 1910: 19. Miocene; shale; Florissant, Colorado.

Podagrion bellator (Dalman), 1825: 390. Gum copal; locality uncertain.

Podagrion capitellatum (Dalman), 1825: 390. Gum copal; locality uncertain.

Podagrion clavellatum (Dalman), 1825: 390. Gum copal; locality uncertain.

Torymus pertinax Förster, 1891: 452. Middle Oligocene; Brunstatt, Alsace.

Torymus sackeni Brues, 1910: 17. Miocene; shale; Florissant, Colorado.

Zophodetus woodruffi Grissell, new species. Oligocene; Dominican amber; Dominican Republic.

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